



The Potential for Micro-Takaful in Sudan: Understanding Public Perception and Adoption Challenges

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Abstract

This study explores the perceptions and barriers to Micro-Takaful adoption among Sudanese citizens, based on a quantitative survey of 428 respondents. Understanding public perceptions is essential for promoting health Micro-Takaful as a practical alternative for financial protection among low-income individuals in Sudan. Despite health Micro-Takaful's potential to provide financial protection to low-income populations, its adoption in Sudan remains limited. Data was collected through an online questionnaire targeting Sudanese adults aged 18 and above and then the analysis was conducted using SPSS version 25. The survey findings highlight that health Takaful coverage increases with age, likely due to greater health awareness or employment benefits, but significant gaps remain, especially among younger and middle-aged adults. This highlights the need for targeted strategies to improve Takaful uptake across all age groups, and targeted interventions to increase health Takaful access in less covered areas, which affect the acceptance of Micro-Takaful products. This paper presents a detailed analysis of Sudanese perception towards Takaful and Micro-Takaful adoption in Sudan.

Keywords: Awareness, perception, takaful, micro-takaful, adoption, Sudan

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1. Introduction

Takaful (Islamic insurance) is defined as a contractual arrangement among a collective of individuals to jointly manage the financial consequences of specific risks that may affect all of them. Once initiated, the process involves making donations, which subsequently leads to establishing a fund that is legally distinct and has its financial obligations. These funds are utilized to compensate any participant who experiences harm, contingent upon a specific set of regulations and a prescribed documentation procedure. The fund is overseen by either a designated group of policyholders or a corporate entity that oversees the activities and strategically allocates the fund's assets in exchange for a specified fee. *Takaful* was also defined by scholars (Salman et al., 2015) as a program, a plan, or an arrangement grounded on brotherhood, harmony, and mutual assistance that provides financial support and service to the participants in case of need, and it is meant for all no matter what the religion is. Salman et al. (2019) defined *Takaful* as the ethical and *Shariah* form of insurance.

Islamic insurance sector in Sudan faces challenges, particularly in the scope of health *Takaful*. Despite the existence of both social and private health *Takaful* schemes, the country struggles to achieve universal coverage (Haroun & Yusoff, 2024), this is due to many obstacles include the high cost of healthcare, economic inflation, and the low affordability of premiums for many individuals, particularly those in the informal sector and among low-income populations (Salim & Hamed, 2018; Yesuf, 2017). The National Health Insurance Fund (NHIF) aims to provide health *Takaful* coverage but currently reaches only a smaller portion of the population, with out-of-pocket payments over 70% of health expenditures (Bashir & Allen, 2023). Furthermore, the availability of essential healthcare services is low, a recent study showed that only 36.8% of primary healthcare facilities in Khartoum meet the World Health Organization's standards for drug availability (Hemmeda et al., 2023). This lack of access to both *Takaful* and healthcare services creates a barrier for low-income individuals, who

are often unable to afford the premiums associated with *Takaful* products (Haroun & Yusoff, 2024; Salim & Hamed, 2018; Yesuf, 2017). This situation is worsened by the ongoing conflict, which has further weakened the already fragile healthcare infrastructure and limited the government's ability to mobilize necessary financial resources (Bashir & Allen, 2023). Moreover, the implementation of health policies has been inconsistent, with gaps in service delivery and access to essential healthcare services. The lack of clarity regarding the responsibilities of various stakeholders within the health system has also contributed to inefficiencies and inequities in healthcare access (Bashir & Allen, 2023). As a result, many individuals, particularly those from low-income communities, remain vulnerable to terrible health expenditures, which can lead to financial concern and reduced access to necessary medical care (Masereka et al., 2024).

In this context, Micro-*Takaful* has emerged as a potential solution for providing financial protection to low-income individuals in Sudan (Haroun & Yusoff, 2024). Micro-*Takaful*, a type of Islamic insurance, provides cost-effective coverage specifically designed for low-income groups. It is based on the principles of mutual cooperation and shared risk, presenting a culturally suitable substitute for conventional insurance (Abdullah et al., 2021; Habbani et al., 2021). By providing low-cost coverage for health-related expenses, Micro-*Takaful* can help mitigate the financial risks associated with healthcare, thereby improving access to necessary services for vulnerable groups (Habbani et al., 2021). This approach not only helps overcome financial obstacles to healthcare but also fosters a sense of unity and mutual support among members. This is particularly important in settings where access to formal *Takaful* coverage remains limited (Habbani et al., 2021). Furthermore, the integration of Micro-*Takaful* into existing health systems could enhance overall health *Takaful* acceptance by providing a more accessible and affordable option for low-income individuals who may otherwise be excluded from *Takaful* schemes (Habbani et al., 2021). This approach aligns with broader efforts to achieve universal health coverage and improve health outcomes in Sudan, particularly for marginalized populations (Habbani et al., 2021).

Gaining insight into public perceptions is crucial for positioning Micro-*Takaful* as a viable financial protection option for low-income individuals in Sudan. However, the effectiveness of these initiatives relies heavily on public awareness and comprehension of *Takaful* products. Studies suggest that limited knowledge about *Takaful* and its advantages is a major barrier to its adoption in various markets, including Sudan (Ahmad & Mahadi, 2023). Therefore, enhancing public awareness through targeted education and outreach campaigns is essential to promote trust and encourage participation in Micro-*Takaful* schemes (Haroun & Yusoff, 2024).

Moreover, public perceptions of *Takaful* sector, influenced by past experiences and existing knowledge, can significantly impact on the willingness of individuals to engage with Micro-*Takaful* products while negative perceptions regarding the reliability and effectiveness of *Takaful* services can discourage them, in that way limiting the growth of Micro-*Takaful* (Zhang et al., 2022). Thus, fostering trust in Micro-*Takaful* as a reliable financial protection solution requires clear communication and active community involvement.

This study provides a detailed exploration of how individuals in Sudan perceive and engage with health Micro-*Takaful*, employing the Theory of Planned Behaviour (TPB) as a guiding framework. While existing research has primarily concentrated on the theoretical and structural aspects of Micro-*Takaful* and *Takaful*, there is a limited understanding of the behavioural factors that influence their adoption, particularly within low-income populations. By examining key elements of the TPB—attitude, subjective norms, and perceived behavioural control—and extended variables: awareness, affordability and behavioural intention, this research offers new insights into the psychological and social drivers behind the adoption of these services in Sudan. The study is based on original survey data collected from Sudanese adults, offering a grounded and context-specific perspective. As a result, it contributes not only to academic discussions but also provides practical guidance for policymakers and stakeholders aiming to improve access to inclusive financial protection for Sudanese low-income groups.

2. Research Objectives

To examine the views and possible challenges affecting the adoption of health Micro-*Takaful* products in Sudan.

3. Literature Review

3.1. Global Perspective on Micro-*Takaful*

The global view of Micro-*Takaful* emphasizes its role as a powerful financial solution for low-income groups, especially in areas where conventional *Takaful* frameworks are insufficient. Micro-*Takaful*, an extension of the

Takaful system, is designed to provide affordable *Takaful* products that align with Islamic principles, making it a culturally acceptable option for many Muslims. This modern approach not only meets the financial protection needs of low-income families but also fosters social unity and communal support, aligning with the fundamental principles of Islamic finance (Abdullah et al., 2021; Rehman et al., 2019).

One of the primary challenges facing Micro-*Takaful* globally is the lack of awareness and understanding among potential beneficiaries (Haroun & Yusoff, 2024). Research indicates that low-income individuals often have limited knowledge about *Takaful* products, which hinders their participation in Micro-*Takaful* schemes (Jahya et al., 2023). For instance, in Malaysia, despite the growth of the *Takaful* sector, only 25% of adult employees in the low-income group have some form of life *Takaful* or family *Takaful* cover, highlighting a significant gap in awareness and accessibility (Jahya et al., 2023). This gap is not only in Malaysia; However, similar patterns are evident in other nations where Micro-*Takaful* is being implemented, highlighting the necessity for focused educational efforts to improve awareness and acceptance of these products (Fauzi & Laldin, 2022). Understanding public perceptions is critical for promoting Micro-*Takaful* as it directly influences the willingness of individuals to participate in these financial products. Factors such as trust, perceived value, and cultural alignment play significant roles in shaping consumer behaviour towards *Takaful* (Bhatti & Husin, 2019; Raza et al., 2019). For example, studies have shown that positive beliefs about *Takaful* can significantly increase the intention to participate in such schemes (Aziz et al., 2019; Bhatti & Husin, 2019; Raza et al., 2019). Conversely, misconceptions or negative views about *Takaful* may discourage potential participants, reducing the impact of Micro-*Takaful* initiatives (Yeo et al., 2023; Schmidt, 2019). Thus, promoting awareness and engaging communities is crucial to creating a supportive environment for Micro-*Takaful* (Alias et al., 2023). Moreover, the financial performance of *Takaful* companies, including Micro-*Takaful* providers, is influenced by their ability to effectively explain the benefits and principles of their products to potential clients (Kantakji et al., 2020). Companies that successfully reflect the mutual assistance and risk-sharing aspects of Micro-*Takaful* can enhance consumer trust and encourage broader participation (Kantakji et al., 2020). Moreover, collaborating with local organizations and community leaders can enhance outreach efforts, helping ensure that information about Micro-*Takaful* reaches the individuals who would benefit the most (Gosemi & Meka, 2021; Ghani et al., 2021).

3.2. Key themes in global Micro-Takaful adoption

The adoption of Micro-*Takaful* globally is described by several key benefits that reflect its potential to provide financial protection for low-income individuals while addressing the unique challenges faced by this group. These topics encompass the significance of education and awareness, the incorporation of Micro-*Takaful* into larger financial systems, the influence of regulatory frameworks, and the effect of socio-economic factors.

- i. **Education and Awareness**
Education is crucial in improving public understanding of *Takaful* principles and offerings. Studies show that insufficient knowledge about *Takaful* considerably hampers its adoption, especially among low-income groups (Hidayat, 2015). Educational programs designed to boost awareness can enable individuals to make better-informed choices about their financial protection options. For instance, studies have shown that targeted educational programs can effectively raise awareness about the benefits and workings of Micro-*Takaful*, thereby increasing participation rates (Hidayat, 2015; Abdullah et al., 2021).
- ii. **Integration into Financial Systems**
Micro-*Takaful* is increasingly being recognized as a complementary product to microinsurance, particularly in regions where *Takaful* models are not accessible to low-income individuals (Qadri et al., 2022; Bhatti & Husin, 2019). Incorporating Micro-*Takaful* into financial systems can improve the overall financial inclusion environment by offering a *Shariah*-compliant alternative that resonates with the values of Muslim communities. For instance, the growth of the Micro-*Takaful* sector in Malaysia demonstrates an increasing acceptance of *Takaful* products among the Malaysian population (Khairi et al., 2020; Eldaia et al., 2021).
- iii. **Regulatory Frameworks**
The creation of robust regulatory frameworks is crucial for the successful implementation of Micro-

Takaful (Fikri et al., 2021). Well-designed regulations can ensure that Micro-*Takaful* products are tailored to the needs of low-income populations while adhering to Islamic principles (Lee et al., 2019; Kamarudin et al., 2023). Countries like Malaysia and those in the Gulf Cooperation Council (GCC) have developed regulatory environments that facilitate the growth of *Takaful*, thereby serving as models for other regions (Nazri et al., 2020; Eldaia et al., 2021; Kamarudin et al., 2023).

iv. Socio-Economic Factors

Socio-economic factors are also crucial in determining the adoption of Micro-*Takaful* (Nordin et al., 2024). Research has shown that income levels, financial literacy, and cultural attitudes towards *Takaful* can influence the demand for Micro-*Takaful* products (Razak et al., 2021; Akhter & Khan, 2017). For instance, low-income individuals may be more persuaded to participate in Micro-*Takaful* if they perceive it as a viable means of financial protection against unforeseen events (Ghani et al., 2021). Additionally, the role of community and social networks can enhance the uptake of Micro-*Takaful*, as individuals often rely on recommendations from trusted sources within their communities (Rifas et al., 2023; Fauzi & Laldin, 2022). Micro-*Takaful* is seen as an important instrument for strengthening social security among low-income families, playing a role in poverty reduction and economic growth (Ghani et al., 2021). For example, in Malaysia, the Micro-*Takaful* program has been crucial in offering coverage to farmers and low-income individuals, thus promoting agricultural development and improving livelihoods (Ghani et al., 2021).

3.3. Cultural Perceptions and Awareness

Cultural views play a significant role in the adoption of Micro-*Takaful*. In numerous Muslim-majority nations, the acceptance of *Takaful* is closely linked to its consistency with Islamic values, which highlight the importance of mutual help and community support (Akhter & Khan, 2017; Aziz et al., 2019). However, awareness of Micro-*Takaful* products remains low among potential beneficiaries, which can hinder their uptake (Abdullah et al., 2021; Ghani et al., 2021). Educational efforts designed to boost awareness and understanding of Micro-*Takaful* are crucial for building trust and driving participation. Studies show that increasing knowledge about *Takaful* can significantly influence individuals' willingness to adopt these products (Aziz et al., 2019; Zawawi et al., 2021). As a result, community involvement and focused outreach initiatives are vital for advancing Micro-*Takaful* in developing economies.

3.4. Current State of Financial Inclusion and *Takaful* in Sudan

In Sudan, financial inclusion is limited, with a large segment of the population unable to access formal financial services. The Financial Inclusion Index for Sudan is notably low. This exclusion is further exacerbated by factors like low financial literacy, insufficient infrastructure, and the absence of financial products specifically designed to meet the needs of low-income individuals and small businesses (Suseno & Fitriyani, 2018). Furthermore, the economic instability and high inflation rates in Sudan have made it challenging for financial institutions to offer affordable *Takaful* products, including Micro-*Takaful* (Idris et al., 2021). *Takaful* sector in Sudan, including Micro-*Takaful*, faces significant barriers to accessibility for low-income populations (Haroun & Yusoff, 2024). Recognizing these obstacles and the importance of financial inclusion is crucial for advancing effective *Takaful* solutions (Alhammedi, 2023).

3.5. Role of Micro-*Takaful* in Enhancing Financial Inclusion

Micro-*Takaful* has the potential to improve financial inclusion by offering affordable *Takaful* products that align with Islamic principles. This approach is particularly relevant in Sudan, where a large portion of the population follows Islamic finance guidelines. Micro-*Takaful* can provide financial protection against risks such as health crises and natural disasters, which are common in the region (Farhat et al., 2019). By focusing on low-income households and small businesses, Micro-*Takaful* can help reduce the financial risks associated with these challenges, promoting economic stability and resilience (Akhter & Khan, 2017).

3.6. Importance of Financial Literacy

Financial literacy plays a crucial role in influencing financial inclusion and the adoption of Micro-*Takaful* products. Studies show that individuals with greater financial literacy are more inclined to use financial

services, including *Takaful* (Bongomin et al., 2017; Bongomin et al., 2020). In Sudan, improving financial literacy among low-income groups can help individuals make well-informed choices about their financial protection options. Educational programs designed to raise awareness of Micro-Takaful, and its advantages can influence participation levels (Habriyanto et al., 2022).

3.7. Regulatory Frameworks and Support

Creating supportive regulatory frameworks is crucial for advancing financial inclusion and fostering the growth of Micro-Takaful in Sudan (Haroun & Yusoff, 2024). Well-crafted regulations can help develop products that meet the needs of low-income individuals while ensuring adherence to Islamic finance principles (Kamarudin et al., 2023).

3.8. Challenges and Opportunities

Despite the potential benefits of Micro-Takaful, several challenges remain. These include the need for greater awareness and understanding of *Takaful* products among the population, as well as the necessity for financial institutions to develop products that are affordable and accessible (Idris et al., 2021). However, there are also growth opportunities, particularly through partnerships with community organizations and the use of technology to reach underserved populations (Suseno & Fitriyani, 2018; Lahoucine, 2023).

3.9. Integration with Islamic Social Finance

Integrating *Takaful* with other Islamic social finance instruments, such as *zakat* and *waqf*, can enhance its ability to promote financial inclusion. These tools can provide additional funding for *Takaful* schemes, making them more accessible to low-income communities (Ezzahid & Elouaourti, 2021). For example, *zakat* funds can be used to subsidize *Takaful* premiums for those in need, thereby increasing participation and ensuring that vulnerable groups have access to financial protection. This approach aligns with the principles of Islamic finance, which prioritize social welfare and community support.

4. Research Methodology

This study investigates the perceptions of Sudanese adults aged 18 and above regarding *Takaful* and Micro-Takaful, with a particular focus on how demographic factors shape their views. Demographic characteristics such as age, gender, education level, and income are often pivotal in understanding public perceptions and adoption behaviours (Christia & Ard, 2016). To explore these relationships, the study employed a combination of descriptive and inferential statistical methods. Crosstabulation analysis was first used to provide an initial picture of how variables such as gender, age, educational level, marital status, income, and employment status relate to the availability and uptake of health *Takaful*. To dig deeper into the factors influencing people's willingness to adopt health Micro-Takaful, a logistic regression analysis was also conducted. This allowed the study to simultaneously assess the predictive power of several variables, including core components of TPB—namely, attitude, subjective norms, and perceived behavioural control and extended variables, awareness, affordability and behavioural intention (Al-Shaghdari & Adeyemi, 2020; Megat et al., 2024). These analyses enabled a more comprehensive understanding of the psychological and demographic drivers of adoption (Muhammad & Al-Shaghdari, 2024). Islamic social finance system: an alternative tool for tackling educational setbacks in Northern Nigeria. *Journal of Islamic Marketing*, 15(11), 3115-3136. Data was collected through an online questionnaire, yielding a total of 428 responses, which provided a diverse and representative sample. The respondents' demographic profiles were described across nine categories: gender, age, education, marital status, income per month, labour or business sector, state or region, health Takaful status, and working status. Of the total sample, 185 respondents (43.2%) were males, while 243 (56.8%) were females. All data analyses were performed using SPSS (Version 25), which supported both basic data exploration and regression modelling.

5. Discussion and Findings

5.1. Descriptive Statistics – Crosstabulation Results

i. Age and Health *Takaful* status

Age is one of the demographic factors that influence product adoption. Studies have shown that younger consumers are generally more open to adopting new technologies and products compared to older

consumers, who may exhibit more caution and resistance to change (Bhardwaj et al., 2023). The crosstabulation of age and health *Takaful* status in this study, as shown in Table 1 below, reveals that health *Takaful* coverage is generally low across all age groups, with 145 respondents insured and 283 not insured out of a total of 428 respondents. Among younger adults aged 18–25, only 10 are insured compared to 16 who are not, indicating minimal coverage in this group. Coverage improves slightly among those aged 26–35, with 39 insured and 59 not insured, while the 36–45 age group has 38 insured and 79 not insured, highlighting a persistent gap. The 46 and above group has the highest number of insured individuals (58), yet the uninsured remain the majority at 129. These findings suggest that health *Takaful* coverage increases with age, likely due to greater health awareness or employment benefits, but significant gaps remain, especially among younger and middle-aged adults. This highlights the need for targeted strategies to improve *Takaful* uptake across all age groups.

Table 1: Age and Health *Takaful* status Crosstabulation

Age * Health <i>Takaful</i> status Crosstabulation				
		Count		Total
		Insured	Not Insured	
Age	18 -25	10	16	26
	26 -35	39	59	98
	36 – 45	38	79	117
	46 and above	58	129	187
Total		145	283	428

ii. Gender and Health *Takaful* status

Research indicates that men and women often have different preferences and attitudes towards products, which can influence their likelihood of adoption (Zhang & Gong, 2022). The crosstabulation of gender and health *Takaful* status in this study, as shown in Table 2, indicates a gap in health *Takaful* coverage between male and female respondents. Out of the total 428 respondents, 145 are insured, while 283 are not insured. Among males, 68 out of 185 (36.8%) have health *Takaful*, whereas the majority (117, 63.2%) do not. Similarly, among females, 77 out of 243 (31.7%) are insured, while the majority (166, 68.3%) remain uninsured. While the number of insured males and females is relatively close (68 vs. 77), the higher number of female respondents results in a slightly larger proportion of uninsured females compared to males. These findings suggest that health *Takaful* coverage is generally low across both genders, with females exhibiting a slightly higher rate of being uninsured. This highlights the need for gender-inclusive policies and interventions to increase health *Takaful* coverage for both male and female populations.

Table 2: Gender and Health *Takaful* status Crosstabulation

Gender * Health <i>Takaful</i> status Crosstabulation				
		Count		Total
		Insured	Not Insured	
Gender	Male	68	117	185
	Female	77	166	243
Total		145	283	428

iii. Education and Health *Takaful* status

Education level influences consumer perceptions and adoption behaviors as well. Educated consumers tend to be more informed about product features and benefits, which can lead to a greater willingness to adopt innovative solutions (Kumar, 2023). The crosstabulation of education level and health *Takaful* status in this study, as shown in Table (3), highlights variations in health *Takaful* coverage across different educational groups. Out of the total 428 respondents, 145 are insured while 283 are not insured. Respondents with a PhD exhibit 29 insured and 67 not insured, indicating a low proportion of coverage despite their higher

educational attainment. Similarly, among those with a master's degree, 34 are insured and 73 are not insured, and among bachelor's degree holders, 66 are insured compared to 115 uninsured. For respondents with a Diploma, 11 are insured while 26 are not insured, reflecting a similarly low coverage rate. Interestingly, among those with Secondary school education, 5 are insured, and only 2 are not insured, likely due to their small sample size (7 respondents in total). These findings reveal that higher educational qualifications do not necessarily correlate with better health *Takaful* coverage, highlighting the need for broader access to and promotion of health *Takaful* irrespective of educational attainment.

Table3: Education and Health *Takaful* status Crosstabulation

Education * Health <i>Takaful</i> status Crosstabulation		Count		
		Health <i>Takaful</i> status		Total
		Insured	Not Insured	
Education	PhD	29	67	96
	Masters	34	73	107
	Bachelor's	66	115	181
	Diploma	11	26	37
	Secondary school	5	2	7
Total		145	283	428

iv. Marital Status and Health *Takaful* status

Research suggests that unmarried individuals may exhibit a greater tendency for adopting new products compared to their married counterparts, who may be more risk-averse and focused on family-oriented products (Triwijayati et al., 2020). The crosstabulation of marital status and health *Takaful* status, as shown in Table 4, reveals significant differences in health *Takaful* coverage based on respondents' marital status. Out of the total 428 respondents, 145 are insured, and 283 are not insured. Among the single respondents, 35 are insured, and 48 are not insured, making up a small proportion of insured individuals. The married respondents exhibit the highest coverage, with 104 insured and 222 not insured, although a large majority of married individuals remain uninsured. Among divorced respondents, only 1 is insured, and 8 are not insured, while the widow category shows 5 insured and 5 not insured, indicating a relatively equal split in this small group. These findings suggest that while marital status does influence health *Takaful* uptake, most respondents, regardless of marital status, are uninsured. Notably, married individuals, despite having the highest number of insured respondents, still show a significant gap in health *Takaful* coverage, highlighting the need for policies targeting health *Takaful* accessibility for all marital statuses.

Table 4: Marital status and Health *Takaful* status Crosstabulation

Status * Health <i>Takaful</i> status Crosstabulation		Count		
		Health <i>Takaful</i> status		Total
		Insured	Not Insured	
Status	Single	35	48	83
	Married	104	222	326
	Divorced	1	8	9
	Widow	5	5	10
Total		145	283	428

v. Income per-month and Health *Takaful* status

Income level is another important factor also affecting product adoption (Triwijayati et al., 2020). Higher-income individuals are often more willing to invest in new technologies, perceiving them as valuable enhancements to their lifestyle (Bhardwaj et al., 2023). While, lower-income consumers may prioritize affordability and practicality, leading to a more cautious approach to adopting new products (Bhardwaj et

al., 2023). The crosstabulation of income per month and health *Takaful* status in this study, as presented in Table (5), highlights a clear relationship between income levels and health *Takaful* coverage. Out of the total 428 respondents, 145 are insured, while 283 are not insured. Among respondents earning between 3,000 – 100,000 Sudanese pounds, 27 are insured and 61 are not insured, suggesting a relatively low uptake of health *Takaful* in this income bracket. For those earning between 100,001 – 200,000, only 12 are insured and 22 are not insured, further indicating limited *Takaful* coverage in the lower income ranges. The 200,001 – 300,000 group shows 21 insured and 28 not insured, while the 300,001 – 400,000 group has 23 insured and 57 not insured, reflecting a similar trend of lower *Takaful* coverage at mid-income levels. However, the 400,001 – 500,000 group exhibits the highest number of insured respondents, with 62 insured and 115 not insured, although the majority are still uninsured. These findings suggest that while higher income correlates with higher health *Takaful* coverage, a significant proportion of individuals across all income brackets remain uninsured, highlighting a need for policies that can make health *Takaful* more accessible to lower and middle-income groups.

Table 5: Income per-month and Health *Takaful* status Crosstabulation

Income per-month * Health <i>Takaful</i> status Crosstabulation				
		Count		Total
		Insured	Not Insured	
Income per-month	3,000 – 100,000	27	61	88
	100,001- 200,000	12	22	34
	200,001- 300,000	21	28	49
	300,001 - 400,000	23	57	80
	400,001 - 500,000	62	115	177
Total		145	283	428

vi. Labor/business sector and Health *Takaful* status

Studies exploring health insurance adoption in low-income countries highlighted some differences in perceptions between the formal and informal sectors. Informal sector workers often face barriers such as low income, limited awareness, and lack of trust in insurance systems, which negatively influence their perceptions. For instance, Sales et al. (2020) found that individuals in the informal sector in the Philippines struggled with understanding the benefits of insurance, emphasizing the need for targeted outreach to improve awareness. Similarly, Ndomba and Maluka (2019) noted that informal workers in Tanzania perceived health insurance as irrelevant due to economic challenges and low awareness levels. Sisimwo et al. (2022) observed in Kenya that dissatisfaction with the quality of services under national schemes contributed to a unwillingness among informal workers to renew their insurance, contrasting with the more positive experiences of formal sector employees. In Ethiopia, Hussien et al. (2022) identified economic instability and mistrust in community-based health insurance schemes as key factors shaping negative perceptions among informal workers. These findings collectively underscore the importance of addressing economic and information barriers to enhance the perception and adoption of health insurance among informal sector workers. Mohsin et al. (2021) explored the willingness to pay for health insurance among government and non-government employees in Bangladesh. Their study found that informal sector workers are less willing to pay for health insurance due to low income and a lack of perceived value, highlighting a significant gap in perceptions between the two sectors. The crosstabulation of labour/ business sector and health *Takaful* status in this study, as shown in Table 6, reveals differences in health *Takaful* coverage across various sectors. Out of the total 428 respondents, 145 are insured and 283 are not insured. In the Agriculture sector, 9 are insured, and 13 are not insured, representing a small proportion of coverage in this group. For those in Education, 38 are insured, while 90 are not insured, indicating a relatively low coverage despite the large number of respondents in this sector. Among those working in Health sector, 17 are insured, and 45 are not, suggesting moderate coverage but still a high proportion without health *Takaful*. In the Communications sector, 10 are insured, and 18 are not insured, while in the Banking and Financial services sector, 7 are insured, and 9 are not. The Police/Army sector shows 8 insured and 7 not insured,

with a nearly equal split. Finally, the other category, with many respondents (157), has 56 insured and 101 not insured, indicating that the largest sector still exhibits a significant uninsured population. These findings highlight that health *Takaful* coverage is generally low across all sectors, with the highest coverage seen in the Education sector, though the majority in each sector remain uninsured. This suggests that improvements in health *Takaful* access are needed across all labour and business sectors.

Table 6: Labor/business sector and Health *Takaful* status Crosstabulation

Labor/business sector * Health <i>Takaful</i> status Crosstabulation				
		Count		
		Health <i>Takaful</i> status		
		Insured	Not Insured	Total
Labor/business sector	Agriculture	9	13	22
	Education	38	90	128
	Health	17	45	62
	Communications	10	18	28
	Banking and Financial services	7	9	16
	Police/Army	8	7	15
	Other	56	101	157
Total		145	283	428

vii. State and Health *Takaful* status

Perceptions of health insurance often vary across regions, due to differences in access to healthcare services; in regions with scarce or low-quality facilities, individuals may see little value in insurance coverage (James & Acharya, 2022; Habib & Zaidi, 2021). On the other hand, community-based health insurance models have shown promise in fostering trust and improving perceptions, especially in low-income areas where collective efforts resonate with local values (Okunogbe et al., 2022; Afriyie et al., 2022). The crosstabulation of state and health *Takaful* status in this study, as shown in Table 7, reveals significant regional differences in health *Takaful* coverage. Out of the total 428 respondents, 145 are insured, while 283 are not insured. In Khartoum, the largest region with 375 respondents, 122 are insured, and 253 are not insured, indicating a relatively higher number of insured individuals but still a significant proportion without coverage. In the Nile River region, only 6 are insured, and 12 are not insured, showing very low coverage in this area. Similarly, in the Red Sea region, 7 are insured, and 8 are not insured, reflecting limited health *Takaful* access. The Other regions, which include 20 respondents, show 10 insured and 10 not insured, indicating an equal split in this small sample. These findings suggest that health *Takaful* coverage is most widespread in Khartoum, while other regions, especially the Nile River and Red Sea, exhibit very low coverage, highlighting regional disparities that may require targeted interventions to increase health *Takaful* access in less covered areas.

Table 7: State and Health *Takaful* status Crosstabulation

State * Health <i>Takaful</i> status Crosstabulation				
		Count		
		Health <i>Takaful</i> status		
		Insured	Not Insured	Total
State	Khartoum	122	253	375
	Nile River	6	12	18
	Red Sea	7	8	15
	Others	10	10	20
Total		145	283	428

5.2. Regression Analysis Results

Table 8: Regression Analysis Summary for Health Micro-Takaful Adoption

Predictor	B (Unstd.)	Std. Error	Beta (Std.)	T	Sig.	Bootstrap SE	Bootstrap Sig. (2-tailed)	95% CI (Lower)	95% CI (Upper)
(Constant)	0.306	0.179	—	1.713	.087	0.231	.181	-0.118	0.790
Attitude	0.264	0.063	0.232	4.182	.000	0.088	.003	0.088	0.425
Behavioural Intention	0.550	0.069	0.491	7.935	.000	0.105	.000	0.345	0.777
Subjective Norms	-0.020	0.075	-0.016	-0.271	.787	0.099	.837	-0.214	0.167
Perceived Behav. Control	-0.120	0.056	-0.102	-2.136	.033	0.082	.140	-0.285	0.043
Awareness	0.204	0.035	0.263	5.845	.000	0.045	.000	0.120	0.293
Affordability	0.032	0.040	0.027	0.794	.427	0.048	.529	-0.064	0.124
Model Fit:									
• $R = 0.820$, $R^2 = 0.673$, Adjusted $R^2 = 0.668$, Std. Error = 0.44616									
ANOVA:									
• $F(6, 421) = 144.354$, $p < .001$									

5.3. Interpretation of Regression Results

The multiple linear regression analysis yielded a statistically significant model, $F(6, 421) = 144.354$, $p < .001$, indicating that the six predictors collectively explain a substantial proportion of the variance in health Micro-Takaful adoption. Specifically, the model accounts for approximately 67.3% of the variance in the adoption outcome ($R^2 = 0.673$), with an adjusted R^2 of 0.668, which corrects for the number of predictors and sample size. This level of explained variance suggests a strong model fit, meaning that the selected factors meaningfully contribute to understanding individuals' likelihood of adopting Health Micro-Takaful services.

The regression equation derived from the model is as follows:

$$\text{Health Micro-Takaful Adoption} = 0.306 + 0.264(\text{Attitude}) + 0.550(\text{Behavioural Intention}) - 0.020(\text{Subjective Norms}) - 0.120(\text{Perceived Behavioural Control}) + 0.204(\text{Awareness}) + 0.032(\text{Affordability})$$

Each coefficient in this equation represents the expected change in the health Micro-Takaful adoption score when that particular predictor increases by one unit, assuming all other variables are held constant.

Among the predictors:

- Behavioural Intention exhibited the strongest influence ($B = 0.550$, $p < .001$), suggesting that individuals with a stronger intent to adopt are significantly more likely to follow through with adoption.
- Awareness ($B = 0.204$, $p < .001$) and Attitude ($B = 0.264$, $p < .001$) also had notable positive effects, indicating that individuals who are more informed and hold favorable attitudes toward the scheme are more inclined to adopt it.
- Perceived Behavioural Control was statistically significant but had a negative association ($B = -0.120$, $p = .033$), implying that individuals who feel they lack personal control over the adoption process may be less likely to participate, potentially due to perceived external barriers.
- In contrast, Subjective Norms ($B = -0.020$, $p = .787$) and Affordability ($B = 0.032$, $p = .427$) were not statistically significant, indicating that social pressure and perceived financial cost do not have a meaningful direct effect on adoption within this sample.

To assess the stability of these findings, a bootstrap procedure with 5,000 resamples was employed. The bootstrap confidence intervals supported the robustness of the significant predictors—Behavioural Intention, Attitude, and Awareness—while further confirming the non-significance of Subjective Norms and Affordability, as their intervals included zero.

Collectively, these results underscore the importance of internal motivational factors—particularly intention, awareness, and attitude—in shaping adoption decisions, whereas external factors such as perceived cost and social influence appear less critical in this context.

6. Implications for Research, Practices and Society

This research sheds light on the practical relevance of health Micro-Takaful and its broader influence across academic, professional, and societal contexts in Sudan.

6.1. Research Implications

The study adds valuable insight to existing literature by exposing how adoption of health Micro-Takaful varies across demographic and regional lines in Sudan. These findings create a foundation for future investigations into how social, cultural, and economic contexts affect participation. They also pave the way for comparative analysis in similar Muslim-majority settings, encouraging further exploration of how Islamic finance tools like Micro-Takaful can enhance financial inclusion.

6.2. Practice Implications

The results offer actionable direction for stakeholders such as insurers, financial planners, and development organizations. By recognizing which populations are underserved, particularly youth and low-income earners—practitioners can develop more effective engagement strategies, including community-based education and trust-building efforts. Moreover, the findings reinforce the importance of aligning regulatory policies with the realities of the target population, potentially prompting reforms that support cost-effective, faith-aligned financial protection options.

6.3. Societal Implications

On a broader scale, increasing access to health Micro-Takaful could lead to significant public benefits. By helping vulnerable populations better manage health-related financial risks, these programs may reduce poverty, improve quality of life, and encourage more inclusive health financing. As awareness and confidence in Micro-Takaful grow, there may also be a cultural shift toward proactive health planning and stronger participation in formal financial systems.

7. Conclusion and Recommendations

The adoption of Micro-Takaful in developing economies is shaped by socio-economic factors, regulatory frameworks, and cultural perceptions. By addressing these areas through targeted educational initiatives, supportive regulations, and community engagement, stakeholders can enhance the effectiveness and reach of Micro-Takaful, ultimately contributing to financial inclusion and economic development. While Takaful sector in Sudan faces numerous challenges, particularly in health Takaful coverage, the introduction of health Micro-Takaful presents a promising opportunity for enhancing financial protection for low-income individuals. By addressing affordability and accessibility issues, barriers to awareness, enhancing financial literacy, and integrating with social finance tools health Micro-Takaful can play a fundamental role in improving health outcomes and reducing the financial burden of healthcare in Sudan. The global perspective on Micro-Takaful highlights its potential to provide financial protection for low-income individuals while highlighting the critical role of public perception in its success. By enhancing awareness and addressing misconceptions, stakeholders can promote Micro-Takaful as a viable solution for improving financial inclusion and resilience among vulnerable populations.

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